Serrated tussock in Tasmania

Christian Goninon, Department of Primary Industries and Fisheries, GPO Box 192B, Hobart, Tasmania 7001, Australia.

Abstract

Serrated tussock (*Nassella trichotoma*) is probably Tasmania's most serious weed threat. It infests approximately 1500 ha of land in south eastern Tasmania and poses an enormous threat to the pastoral industry and environment. A taskforce with representation from affected land managers has been formed and a strategy is being developed with the aim of managing, if not eradicating, existing infestations.

Introduction

Serrated tussock has been described as one of the world's worst weeds. Originally from South America, it is an aggressive, invasive perennial grass with the ability to thrive under dry conditions. It has no value as stock feed and stock grazed in paddocks infested with serrated tussock can starve to death (Campbell 1982). The weed is a major threat to Tasmania's pastoral industry and can disrupt sensitive native grasslands. It is confined to the Clarence and Sorell Municipalities with small areas in the Tasman Municipality and on King Island (Figure 1). Approximately 50% of the infestations can be classed as being light in density (<3 plants m^{-2}). The remaining infestations are equally proportioned between medium (3–10 plants m^{-2}) and heavy (10–20 plants m^{-2}) (Bishop 1995).

It is most abundant on shallow doleritic soils, on mixed farming and lightly forested properties where rainfall averages 550 mm per annum and is winter dominant (Harradine and Watson 1979), and where competition from native and improved pasture is difficult to achieve. Based on climatic predictions, failure to eradicate the present infestations of serrated tussock will potentially lead to invasion of the majority of Tasmania's grazing areas, and lightly timbered areas in the east and north. Areas with poor native or commercial pasture on the east coast will be most susceptible (Boersma 1995).

History

It is thought that serrated tussock was introduced to mainland Tasmania in pea seed imported from New Zealand during the 1920s (Blacklow 1960) as the weed was located in many areas where green peas were grown for the Hobart market. It was first identified at Sandford in 1956 (Fricke 1956) and was thought to be confined to an infestation of 40 ha on one property. Surveys undertaken between 1956 and 1965, however, revealed a total infested area of approximately 3200 ha (Harradine and Watson 1979). By 1977 an eradication program undertaken by the Department of Agriculture, involving quarantine measures and technical and financial assistance to landholders, had reduced the level of infestation to about 800 ha (Harradine and Watson 1979). Approximately 10 ha of serrated tussock was located on King Island in 1977 but subsequent surveys indicate that serrated tussock has spread considerably.

Current situation

Mapping undertaken by the Department in 1995 indicated approximately 1500 ha of affected land (Bishop 1995). Estimates indicate a potential annual loss of at least $50m to the grazing industries should it spread to all predicted available habitats (Bishop 1995). It also poses a significant threat to sensitive native grasslands and conservation areas. A management strategy is currently being developed in Tasmania by a recently formed taskforce consisting of land managers (both private and Crown) in the infested areas. It will include an awareness campaign highlighting the potential threat of the weed and how to identify it.

Land subdivision within serrated tussock infested areas is becoming increasingly important. Proliferation of 2–5 ha holdings (80 small blocks involved in 1967/68, 500 in 1978 and probably 600–700 now), many with interstate or overseas owners, means that a large number of people have to be aware of, and act to control, the weed (Harradine and Watson 1979). This can impede management, but it can also be beneficial as the cost of control per person is reduced. Community based regional strategies will be encouraged to provide a more co-ordinated, integrated and strategic approach to serrated tussock management.

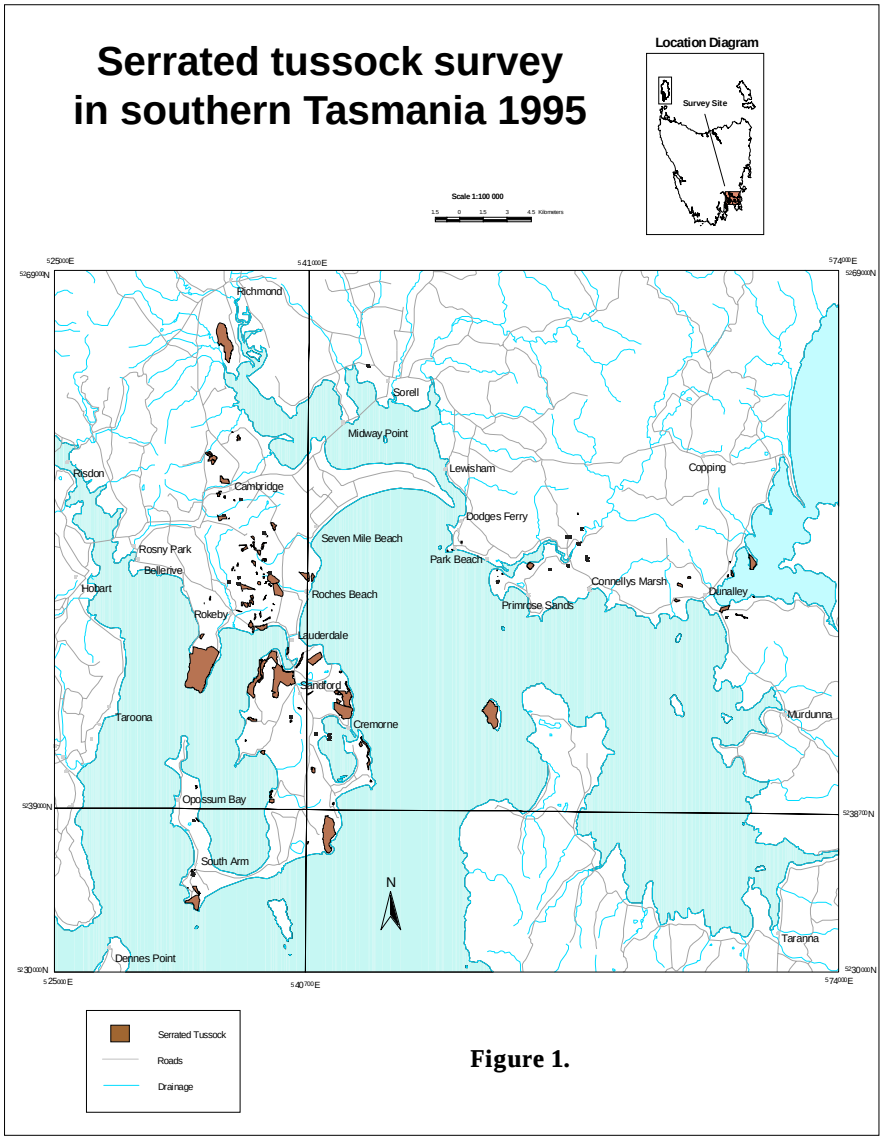

Figure 1.

The taskforce will also have the role of implementing a number of strategies with the following goals in mind:

- Preventing further spread.
- All relevant people being able to recognize it.
- All areas of serrated tussock to be covered by a community management strategy and subject to an appropriate management plan.
- Monitoring success of the strategy.

WeedPlan, Tasmania's Weed Management Strategy, promotes the fact that weeds are everyone's problem and aims to encourage the development of local and catchment/regional community based weed management programs. This approach has been adopted by Department of Primary Industries and Fisheries to manage serrated tussock and other significant weeds in Tasmania (WeedPlan 1996).

Conclusion

Serrated tussock has the potential to become a devastating weed in Tasmania. Action is often delayed until there is tangible evidence of a weed becoming a significant problem by which time the costs associated with eradication or management become exorbitant. Tasmania is in a fortunate position in having the ability to prevent serrated tussock from becoming a significant problem.

A co-operative and co-ordinated response involving land managers, community groups, local councils and state government agencies is the essence of Tasmania's approach to isolate and contain serrated tussock.

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Fungi in Victoria with biological control potential for *Nassella trichotoma* (serrated tussock)

I.P. Hussaini[A], A.C. Lawrie[A] and **D.A. McLaren[B]**, Co-operative Research Centre for Weed Management Systems

[A] Department of Applied Biology and Biotechnology, RMIT University, GPO Box 2476V, Melbourne, Victoria 3001, Australia.

[B] Department of Natural Resources and Environment, Keith Turnbull Research Institute, PO Box 48, Frankston, Victoria 3199, Australia.

Abstract

Serrated tussock is a noxious pasture weed in Australia which is not well controlled. The aim of this study was to find fungal pathogens in Australia that cause death or reduction in seed set. Two fungi found on serrated tussock near Melbourne appear to have potential for biological control. *Zinzipegasa argentinensis* was observed causing black lesions on culms, reduction in flowering and apparently death of plants at Melbourne Airport and near the Organ Pipes National Park. *Fusarium* was associated with a crown rot in plants at Werribee and near the Organ Pipes National Park. These fungi should be investigated further for their potential to control serrated tussock, either as classical biocontrol agents or as mycoherbicides.

Introduction

Serrated tussock (*Nassella trichotoma* (Nees) Hack. ex Arechav.) originally from Argentina is one of the most serious agricultural and environmental weeds in south-eastern Australia (Campbell and Vere 1995). It currently occupies 1 million ha, mainly in New South Wales and Victoria, costs $55 million per year and, without effective control, could expand to 32 million ha (McLaren *et al.* 1998).

Various control methods have been proposed and implemented, ranging from burning and shading out to spray topping with herbicides such as flupropanate and glyphosate (Campbell 1998). None has been effective in stopping the spread of the weed and the cost of treatment on poor land is prohibitive (Campbell 1998).

The magnitude of the potential spread and cost of control has prompted calls for biological control (Briese and Evans 1998, McLaren *et al.* 1998). Wapshere (1990) discounted the feasibility of using fungi on the grounds that none had been recorded from *N. trichotoma* and that some rusts and smuts could infect species of both *Nassella* and *Stipa*, thus posing a threat to many Australian species of *Stipa*. However, a recent taxonomic revision suggests that Australian *Stipa* species are only distantly related to *Nassella* (Briese and Evans 1998). Furthermore, surveys of *N. trichotoma* in Argentina during 1995-6 found nine previously unrecorded species of fungi causing severe plant damage (Briese and Evans 1998). They therefore suggest that safe classical biological control agents may exist in Argentina and should be explored further. This would be costly, involving further surveys and pathogenicity testing against a wide range of grasses before satisfying quarantine regulations for importation to Australia.

The questions of safety and cost largely do not arise if fungal pathogens causing death of individual plants or reduction in seed set already exist on *N. trichotoma* in Australia. No previous survey in Australia has recorded any fungal pathogen, but a similar situation also existed for *N. trichotoma* in Argentina before the 1995-6 surveys (Briese and Evans 1998). The discovery of such pathogens in Australia could be valuable in obviating the time, expense and risk incurred to import exotic pathogens. Even if the pathogens do not spread naturally at a rate sufficient to control serrated tussock, mycoherbicide application might allow control or contribute to control by other methods.

The aim of this study was therefore to find fungal pathogens capable of causing death or reduction in seed set in serrated tussock in Australia.

Materials and methods

Collection of infected plants

Serrated tussock plants were surveyed within a 50 km radius of Melbourne during 1996–7.

***Zinzipegasa argentinensis* (Spegazzini) Nag Raj** Plants with black lesions on culms and reduction in flowering and seed set were collected on private property near the Organ Pipes National Park and at Melbourne Airport, 18–25 km N.W. of Melbourne, Victoria, during December 1997 and February 1998. Dead plants with the same symptoms were also collected from a fenced ungrazed area heavily infested with serrated tussock on private property near the Organ Pipes National Park. These areas had not been sprayed with herbicides for several years.

***Fusarium* sp. Link ex Fries.** Plants with a basal 1–5 cm of external white mycelium